NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

WINDBREAK/SHELTERBELT ESTABLISHMENT
(Feet)
CODE 380

GENERAL SPECIFICATIONS

Procedures, technical details and other information listed below provide additional guidance for carrying out selected components. This material supplements the requirements and considerations listed in the conservation practice standard.

Spacing Between the Rows

Spacing between rows except for twin row high density shall be as shown below. Plan the row spacing wide enough for maintenance equipment to operate freely between rows. Usually, about 4 feet of additional space is needed along with the planned mature width of the species.

	Shrubs	Low Broadleaf (<25' ht) & Junipers	Broadleaf and Conifer Trees
Shrubs	8-20	12-24	16-30
Low Broadleaf (<25' ht.) & Junipers	12-24	12-24	16-30
Broadleaf * and Conifer Trees	16-30	16-30	16-30

* Any row with species that have an overtopping habit of growth shall not be planted within 20 feet of any other species. Species with an overtopping habit include Siberian elm, cottonwoods, honey locust, silver maple, black locust and tree-type willows.

Spacing Within the Row

Single-row field windbreaks and multiple-row living snow fences:

Shrubs	3 to 8 ft.
Low Broadleaf	<25' ht – 6 to 10 ft
Junipers	6 to 10 ft
Conifers	8 to 16 ft
Tall/Medium Broadleaf	10 – 18 ft

Multiple-row field, farmstead and feedlot windbreaks:

Shrubs -- 3 to 8 ft.

Junipers -- Windward row -- 6 to 10 ft.

Junipers -- Leeward rows -- 6 to 12 ft.

(at the widest spacing, replanting will be essential when mortality occurs due to the large gaps created)

Low Broadleaf (<25' ht) -- 8 to 12 ft.

Tall/Medium Broadleaf -- 10-18 ft.

(use 6 to 8 feet for columnar poplars)

Pines -- 10 to 16 ft.

Spruces -- Windward row -- 8 to 12 ft.

Interior rows of multiple row windbreaks-- 12 to 18 ft.

Twin-row High Density

Junipers and shrubs are the preferred species in this type of planting. Large spreading trees such as cottonwoods, elm and willows are not to be used in twin-row high-density plantings.

Rows are 6 to 10 feet apart in each twin-row. If fabric mulch is installed, rows will need to be 8 to 10 feet apart. Each set or "twin-row" is 25 to 50 feet from the next "twin-row". A twin-row, high-density example is listed below.

Twin-row A -- Shrubs or Junipers

(Windward row).--.25 to 50 ft.

Twin-row B – Broadleaf -- 25 to 50 ft.

Twin-row C – Conifers -- 25 to 50 ft.

Twin-row D -- Shrubs or Junipers

Within-row spacing:

Shrubs -- 3 to 6 ft.

Junipers -- 6 to 10 ft.

Broadleaf and Conifer Trees -- 8 to 12 ft.

Potential Row Arrangement and Composition for Multiple-row Windbreaks

Juniper:	Row Number:
2-row	1-2
3-row	1-2-3
4-row	1-2-4
5-row	1-2-5
6-row	1-2-6

Pine:	Row Number:
2-row	1-2
3-row	2-3
4-row	3-4
5-row	4-5
6-row	4-5-6

Spruce:	Row Number:
2-row	1-2
3-row	3
4-row	4
5-row	4-5
6-row	5-6

Low Broadleaf:	Row Number:
2-row	2
3-row	3
4-row	3-4
5-row	4-5
6-row	3-5-6

Broadleaf:	Row Numbers:
2-row	2
3-row	2
4-row	2-3
5-row	3-4
6-row	3-4-5

Shrubs:	Row Numbers:
2-row	1
3-row	1-3
4-row	1-4
5-row	1-5
6-row	1-6

INSTALLATION PROCEDURES

Selection of Material

Trees and shrubs will be selected that are adapted to the site-specific soil and climate conditions. Tables 1 and 2 can be used to select suitable materials.

Preparation of Planting Sites

Planting sites shall be properly prepared based on the soil type and vegetative conditions listed below. (Caution: Avoid cropland sites that have had recent heavy applications of harmful pesticides.)

INSTALLATION PROCEDURES

Preparation of Planting Sites (Cont.)

All site preparation will take cultural resources into consideration.

V ditching can be effective for water harvesting as part of site preparation. Caution must be taken to not make the V ditch more than 2 inches deep.

Loamy/clayey soils

- Sod and alfalfa land

Summer fallow 1 year is preferred to kill the sod. Till 1/ in the spring prior to tree planting. A fall-sown crop of small grain may be used where needed to control erosion.

Sod may be killed by non-selective herbicides the year prior to tree planting. 2/ Plant trees in the residue. On heavy soils, tillage is usually necessary to achieve a satisfactory planting when a tree-planting machine is used.

- Cropland

If the site is in row crop, till in the fall prior to planting the trees. Check to see if the site has a plow or hard pan in the subsoil; if it exists, a deep disking or ripping should be done in the fall. A fall-sown crop of small grain may be used where needed to control erosion.

If the site is in small grain stubble, the trees may be planted in the spring without further preparation.

Tillage operations on steep slopes must be on the contour or with terraces where practical. A cover crop between the rows may be necessary to prevent erosion.

Sandy soils

- Sod and Alfalfa Land

Till and plant to a spring cover crop (corn, grain, sorghum, etc.) the year prior to tree planting. Leave a stubble cover in which to plant the trees. A light disking may be needed before tree planting if fabric mulch is used.

Sod may be killed by non-selective herbicides 2/ the year prior to tree planting. Plant trees in the residue.

When hand planting, scalp or strip an area at least 36 inches in diameter and two to four inches deep. (Subsequent planting of the tree will be in the scalped area.)

Roto-till a 36-inch wide strip. (Subsequent planting of the tree will be in the tilled area.) Where a drip watering system will not be used, roto-till the strip the year prior to tree planting and keep clean tilled to allow accumulation of ground moisture.

- Cropland

If the site is in small grain, corn or similar clean tilled crop, and it is reasonably free of weeds, plant trees in the stubble without prior preparation. It may be necessary to till a narrow strip with a disk or other implement to kill weeds or volunteer grain, or to prevent stalks and other residue from clogging the tree planter. If fabric mulch is used, disking may also be needed. A cover crop or stubble must be maintained between the rows to protect the trees from soil blowing.

- Non-tillage Sites and/or Erosive sites (because of steepness or other limitations)

On sites where it is not practical or possible to operate equipment, where tillage of the entire site will cause excessive erosion, or where tillage of the entire site is impractical, the following methods of site preparation may be used.

Scalp an area at least 36 inches wide the year prior to tree planting. (Subsequent planting of the tree will be in the center of the scalped area.)

Roto-till a strip at least 36 inches wide the year prior to tree planting. (Subsequent planting of the tree will be in the center of the tilled area.)

Kill the vegetation with a non-selective herbicide 2/ in a 36-inch diameter or larger area, or in a 36 inch or wider strip the year prior to tree planting and plant in the treated area.

OPERATION AND MAINTENANCE

Control of Competing Vegetation

- On soils that are not susceptible to severe wind erosion competitive vegetation shall be controlled by the following alternative methods.

- **Between the tree rows**

Clean cultivation with a spring tooth harrow, sweep chisel plow (duckfoot), disk (tandem disk only), shovel cultivator, or other tillage implement.

Tillage depth would be two to four inches to avoid damage to tree roots.

Plant annual cover crops of grain sorghum, oats, corn, forage sorghum, etc. If perennial grasses are used, only short non-rhizomatous grasses such as blue grama, Indian rice grass, etc. will be allowed. Approximately 4 feet should be left between the cover crop and the tree row.

In some cases, chemicals may be used on the entire windbreak area to control competitive vegetation. If this method is used, caution must be taken to avoid severe erosion and concentration of the chemicals from runoff. 2/

- **In the tree row (maintain a 3-6 ft. weed free strip within the row)**

Hand hoeing.

Tractor mounted row hoes or weed badgers.

Over the row cultivation with a flexible tine or finger type weeder, effective only when weeds are very young such as the two leaf stage.

Chemical weed control in a 1.5 to 3 foot band adjacent to each side and in the row approximately once each month during the growing season, or use of soil applied herbicides. 2/

A roto-tiller may be used, but not more than 4 inches deep.

Polypropylene fabric mulch must be at least 6 foot wide and meet other requirements as described in criteria.

- On sites prepared prior to tree planting, where severe wind erosion is a hazard or where tillage was not possible, competitive vegetation shall be controlled by the following methods.

- **Between the tree rows - tilled sites**

Cover crops of grain sorghum or forage sorghum or other adequate cover crops should be maintained in the area between tree rows. If perennial grasses are used, only short non-rhizomatous grasses such as blue grama and Indian rice grass, etc. will be allowed.

Approximately 4 feet should be left between the cover crop and the tree row.

Between the tree rows - un-tilled sites or grass cover

Mow between the rows approximately once each month during the growing season.

- **In the tree rows**

Hand hoeing.

Tractor mounted row hoes or weed badgers.

Over the row cultivation with a flexible tine or finger-type weeder, effective only when weeds are very young such as the two leaf stage.

Chemical weed control in a 1.5 to 3 foot band adjacent to each side of each plant and in the row approximately once each month during the growing season, or use of soil applied herbicides. 2/

Polypropylene fabric mulch must be at least 6 foot wide and meet other requirements as described in criteria.

Protection from Animal Damage

The best defense is maintaining good weed control within row and mowing between rows to reduce rodent habitat. Control mice, gophers and other undesirable rodents by the use of poison baits. Mouse baits should be placed in tin cans nailed to a board. Gopher baits are best placed with a machine of the "gopher getter" type. Follow pesticide directions and heed all precautions on the container label. If they are not handled properly or if unused portions are disposed of improperly, they may cause injury to humans, animals, fish and other wildlife, desirable plants, honey bees and other pollinating insects, and may contaminate water supplies.

Physical Barriers will deter grazing and browsing of plant materials. Acceptable material includes chicken wire with a mesh that does not exceed 1 inch will be shaped to form a cylinder a minimum of 5" in diameter and 18" in height. A minimum of 1 24 inch 1'X2" stake with 18 inches extending above the ground will be used to support the chicken wire. The chicken wire will be fastened to the stake by 2 evenly spaced staples or 2 wire ties. The bottom the cylinder will be flush with the ground. The barrier must be removed when the trunk diameter is within ½ inch of the chicken wire diameter.

Another acceptable physical barrier includes rigid polypropylene mesh tubes. Tubes will be of a diamond pattern with a minimum 30 mil standard diameter. The tubes will be a minimum of a 5-inch diameter and 18 inches high. The tubes will be fastened to a 24" long 1" X 2" stake with 18 " extending above the ground. Attachment will be with a single wire tie or staple. The bottom the cylinder will be flush with the ground.

Watering Requirements - All Species

Supplemental water must be planned for almost all species on all sites. This will be required in case of drought and for the plants to reach their full potential. All trees and shrubs, even those native to an area, are susceptible to extended droughts. Water will have to be planned for the dormant season since severe droughts during this period can have a significant impact on tree health. Do not water during the dormant season if the ground is frozen since the water will not soak into the ground and water lines may be frozen.

An exception to required supplemental water for plantings is in the mountain country where the planted species do grow naturally to their full potential. Plantings with adaptable native plants and a satisfactory mulch may also be exempt from supplemental water requirements.

Irrigation intervals will lengthen as new plantings age and develop a deeper and more extensive root system. Set time will also increase to accommodate an increasing demand for water.

Soak the soil profile within the drip line of the plants thoroughly to a depth of 3 to 5 feet and do not irrigate again until the profile has drawn down to 50 to 60 percent of available water holding capacity. This will require adding drip lines or increasing the area of flooding as the trees mature to provide water for an increasing root zone. For columnar trees the root system develops well outside the drip line and watering will have to be adjusted to account for this.

If polypropylene fabric mulch is used for within row weed control and moisture conservation, the amount of supplemental water needed may be reduced. The amount of reduction may be up to 50% with confirmation by field check to determine effectiveness of the mulch. Care must be taken to not over water, which can drown out the roots and kill the plants.

Footnotes

1/ The term "till" includes the use of moldboard plows, disk plows, roto tillers and similar equipment.

2/ CAUTION: "Weed and Brush Control" by NMSU will be used for all herbicide recommendations. If pesticides are used, apply only when needed and handle with care. Follow the directions, and heed all precautions on the container label. If the pesticides are not handled or applied properly, or if unused portions are disposed of improperly, they may cause injury to humans, animals, fish and wildlife, desirable plants, honey bees and other pollinating insects, and may contaminate water supplies.

Table 1

Pinus eldarica - Afghanistan pine, Mondale pine, Eldarica pine. A fast growing pine suitable for elevations under 4,500 feet in New Mexico. It attains a height of about 70 feet and crown width of 30 feet. *Best uses* are in windbreaks or as Christmas trees. *Possible insect or disease problems*: Nantucket pine tip moth, Ips bark beetles, spider mites. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: poor.

Cupressus arizonica - Arizona cypress, ciprés, cedro. A moderate to fast growing evergreen suitable for elevations under 5,500 feet in New Mexico. It attains a height of about 40-60 feet with a crown width of 25 ft. *Best uses* are in windbreaks or for reforestation in SW New Mexico in its native range. *Possible insect or disease problems*: spider mites, western cedar borer, cypress bark beetles. *Drought resistance*: excellent. *Alkaline toleranceance*: very good. *Cold hardiness*: fair.

Juniperus virginiana - Eastern redcedar, Virginia juniper. A moderate growing evergreen suitable for elevations of 3,500 - 7,000 feet in New Mexico. It attains a height of 25-30 feet with a crown width of 15-25 feet. (Western seed sources make this a conical rather than a columnar tree.) *Best uses* are in windbreaks, living snow fences and energy conservation plantings. *Possible insect or disease problems*: spider mites, western cedar borer, gymnosporangium rusts. *Drought resistance*: excellent. *Alkaline tolerance*: good. *Cold hardiness*: very good.

Pinus edulis - Piñon (pinyon) pine, chá'o/. A slow grower, it is the State Tree of New Mexico and is suitable for elevations of 3,500 - 8,500 feet. It attains a height of 20-40 feet and a crown width of up to 30 feet. *Best uses* are for wildlife plantings, reforestation, erosion control and windbreaks. *Possible insect or disease problems*: Ips bark beetles, piñon needle scale, needle miner, twig beetles, tiger moth, pitch moth, spindle gall midge, dwarf mistletoe. *Drought resistance*: excellent. *Alkaline tolerance*: good. *Cold hardiness*: very good - excellent.

Pinus sylvestris - Scotch pine, Scots pine. A moderate to rapid growing evergreen suitable for elevations of 4,000 - 7,500 feet in New Mexico. It attains a height of 40-60 feet with a 20-40 foot crown width. *Best uses* are for wildlife plantings, Christmas trees, windbreaks and energy conservation plantings. *Possible insect or disease problems*: Ips bark beetles, pine needle scale. *Drought resistance*: very good. *Alkaline tolerance*: moderate. *Cold hardiness*: very good.

Pinus nigra - Austrian pine, Austrian black pine. A moderate growing evergreen suitable for elevations of 4,000 - 7,000 feet in New Mexico. It attains a height of 40-50 feet with a crown spread of 30 feet. *Best uses* are for wildlife plantings, windbreaks, sound screens and energy conservation plantings. *Possible insect or disease problems*: Ips bark beetles, twig beetles. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: fair - good.

Juniperus scopulorum - Rocky Mountain juniper, cedro rojo, enebro, sabina, gad ni'ee/ii. A native, moderate growing evergreen suitable for elevations of 4,000 - 9,000 feet in New Mexico. It attains a height of 20-50 feet and a crown width of 15-35 feet. *Best uses* are for windbreaks, reforestation, wildlife plantings (good for cover and food), wood products (posts, fuel wood), erosion control and sound screens. *Possible insect or disease problems*: spider mites, western cedar borer, gymnosporangium rusts, juniper bark beetles, juniper mistletoe. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: excellent.

Pinus ponderosa - Ponderosa pine, western yellow pine, pinabete, pino real, nídíshchíí. A moderate to rapid growing native, preferring well drained soils, it is suitable for elevations of 5,000 - 9,000 feet in New Mexico. It attains a height of 40-100 feet and a crown spread of up to 60 feet. *Best uses* are for reforestation (the most important wood, economically in the SW), windbreaks and wildlife plantings. *Possible insect or disease problems*: bark beetles, pine tip moth, twig beetles, tiger moth, sawflies, dwarf mistletoe. *Drought resistance*: excellent. *Alkaline tolerance*: moderate. *Cold hardiness*: excellent.

Pseudotsuga menziesii - Douglas-fir, red fir (not a true fir), abeto de douglas, pino colorado. A slow to moderate growing native evergreen with an elevation range of 5,000 - 9,000 feet in New Mexico. It attains a height of 70-100 feet with a crown spread of up to 35 feet. *Best uses* are for reforestation (an important timber species in the western US),

wildlife plantings and Christmas trees. *Possible insect or disease problems*: spruce budworm, wooly aphids, Douglas-fir tussock moth, dwarf mistletoe. *Drought resistance*: good in its native range. *Alkaline tolerance*: low. *Cold hardiness*: excellent.

Pinus strobiformis - Southwest white pine, closely related to limber pine, al caguí. A moderate growing native evergreen with an elevation range of 5,500 - 10,000 feet in New Mexico. This formal, blue-green tree attains a height of 60-80 feet with a crown width of up to 30 feet. *Best uses* are for reforestation, windbreaks, Christmas trees and wildlife plantings. It produces an edible seed much like the piñon pine. *Possible insect or disease problems*: bark beetles, twig beetles, dwarf mistletoe, white pine blister rust. *Drought resistance*: good in its native range. *Alkaline tolerance*: low-moderate. *Cold hardiness*: excellent.

Picea pungens - Blue spruce, Colorado blue spruce (Colorado's State Tree), abeto, balsame. A slow to moderate growing evergreen with an elevation range of 4,500 - 9,500 feet. It attains a height of 60-100 feet and a crown width of about 20-35 feet. *Best uses* are for reforestation, windbreaks, landscape and wildlife plantings. *Possible insect or disease problems*: Douglas-fir tussock moth, needle scale, gall adelgids, bark beetles, spruce aphid. *Drought resistance*: fair. *Alkaline tolerance*: low - moderate. *Cold hardiness*: excellent.

Abies concolor - White fir, concolor fir, pinabete, abeto, ch'ó/gaii. A slow growing, native evergreen with an elevation range of 5,500 - 9,500 feet. It attains a height of 60-100 feet and a crown spread of 20-35 feet. *Best uses* are for reforestation and Christmas trees (a popular Christmas tree in New Mexico). *Possible insect or disease problems*: spruce budworm, tussock moth, aphids, root rot. *Drought resistance*: fair to good in its native range. *Alkaline tolerance*: low. *Cold hardiness*: excellent.

Prunus virginiana - Chokecherry, capulin, shashdaa'. A native shrub or small tree with an elevation range of 5,000 - 9,000 feet. It attains a height of 6-20 feet and a crown spread of 6-20 feet. *Best uses* are for wildlife plantings, windbreaks, erosion control in its native range. It can be poisonous to livestock, but edible fruit produces excellent jellies and pies. *Possible insect or disease problems*: borers, pear slug, tent caterpillar, black knot, fireblight. *Drought resistance*: good. *Alkaline tolerance*: good. *Cold hardiness*: excellent.

Syringa vulgaris - Lilac. An attractive, white to violet flowered shrub with an elevation range from 4,500 - 8,000 feet. This rapid grower attains a height of 8-12 feet with a crown spread of 8-12 feet. *Best uses* are for windbreaks (it forms a dense barrier) and wildlife plantings (moderately high for songbirds). *Possible insect or disease problems*: lilac borer, leaf miners, lilac leaf blotch, powdery mildew. *Drought resistance*: good. *Alkaline tolerance*: good. *Cold hardiness*: excellent.

Prunus americana - Native plum, American plum, ciruela cimarrona. A rapid growing, thicket forming shrub with an elevation range of 4,500 - 8,000 feet. A native, it attains a height of 6-8 feet and a crown spread to 8 feet. *Best uses* are for wildlife plantings (browsers, nesting cover & food) and windbreaks. The fruit is edible & makes excellent jelly. *Possible insect or disease problems*: pear slug, aphids, fireblight, powdery mildew. *Drought resistance*: good. *Alkaline tolerance*: good. *Cold hardiness*: excellent.

Rhus trilobata - Skunkbush sumac, three-leaf sumac, zamague, lemita, k'ii'. This native, moderate to rapid grower has an elevation range of 4,500 - 8,000 feet. With brilliant orange to red fall foliage, it attains a height of 4-6 feet with a crown spread of up to 8 feet. *Best uses* are for windbreaks, wildlife plantings (excellent for many birds) and erosion control. *Possible insect or disease problems*: no serious pests. *Drought resistance*: excellent. *Alkaline tolerance*: excellent. *Cold hardiness*: excellent.

Prunus tomentosa - Nanking cherry, cerezo. A rapid grower with an elevation range of 5,000 - 8,000 feet. It attains a height of 8 feet with an 8 foot crown spread. *Best uses* are for wildlife plantings (high for game birds and song birds) and windbreaks. The fruit is edible & makes excellent jelly. *Possible insect or disease problems*: tent caterpillars, black knot. *Drought resistance*: good. *Alkaline tolerance*: good. *Cold hardiness*: excellent.

Rosa woodsii - Woods rose, rosal, rosa de castilla. A moderate to rapid grower with an elevation range of 5,000 - 9,500 feet. This spreading plant attains a height of 4 feet. It produces a beautiful, simple, pink rose flower. *Best uses* are for wildlife plantings (relished by grouse, turkey and pheasant), erosion control above 7,500 feet and windbreaks. *Possible*

insect or disease problems: leaf cutter bees, powdery mildew. *Drought resistance*: fair to good. It prefers moist sites. *Alkaline tolerance*: fair - moderate. *Cold hardiness*: excellent.

Atriplex canescens - Four-wing saltbush, chamiso, cenizo, díwózhii/beii. A native shrub with a moderate growth rate. It's elevation range in New Mexico is broad at 3,000 - 8,000 feet. It attains a height of 3-6 feet with a 4-6 foot spread. *Best uses* are for wildlife plantings (good forage value), erosion control (mine reclamation, severe erosion) and windbreaks. *Possible insect or disease problems*: no serious pests. *Drought resistance*: excellent. *Alkaline tolerance*: excellent on both alkaline and saline soils. *Cold hardiness*: good.

Ribes aureum - Golden current, garanbullo, k'ínjí/'ahí. A native shrub with a moderate growth rate. It's elevation range is 6,000 - 8,000 feet. It attains a height of 4-6 feet with a crown width of 3-5 feet. *Best uses* are for wildlife plantings (good food and nesting cover), windbreaks, erosion control in it's native range. It produces an edible fruit. *Possible insect or disease problems*: oyster shell scale, alternate host of white pine blister rust. *Drought resistance*: good. *Alkaline tolerance*: low to fair. *Cold hardiness*: good.

Forestiera neomexicana - New Mexico forestiera, New Mexico olive, New Mexico privet, adelia, palo blanco. A native shrub with a moderate growth rate. It's elevation range in New Mexico is broad at 4,000 - 7,500 feet. It attains a height of 8-10 feet and a crown width of 8-10 feet. *Best uses* are for wildlife plantings (it produces a small bluish-black fruit which birds like), windbreaks, erosion control (especially in the upper riparian zone). *Possible insect or disease problems*: No major pests. Eriophyid mites a minor problem. *Drought resistance*: excellent. *Alkaline tolerance*: good - very good. *Cold hardiness*: good.

Fraxinus pennsylvanica - Green ash, fresno. A rapid grower, it grows well from 2,000 - 7,000 feet in New Mexico. It attains a height of 40-75 feet with a grown spread of 20-35 feet. *Best uses* windbreaks, wildlife plantings (fair for songbirds) and energy conservation plantings. It does best in well drained soils. *Possible insect or disease problems*: red headed ash borer, oyster shell scale, brownheaded ash sawfly, hornworms, ash bark beetle, leafcutter bees, clear wing moths. *Drought resistance*: good - excellent. *Alkaline tolerance*: good. *Cold hardiness*: excellent.

Populus deltoides x - Noreaster cottonwood, hybrid cottonwood, alamo. It is a sterile female, usually cottonless. A rapid grower at elevations to 7,000 feet. It attains a height of 75-100 feet with a crown spread of 50 feet. The crown shape is columnar when young, but broadens with age. *Best uses* are windbreaks and erosion control in moist areas. Fair nesting and roosting cover for birds. *Possible insect or disease problems*: leaf miners, fall webworm, poplar borers, oyster shell scale, cytospora canker, bacterial wetwood, Marssonina blight. *Drought resistance*: poor. *Alkaline tolerance*: good. *Cold hardiness*: very good.

Populus angustifolia - Narrowleaf cottonwood, mountain cottonwood, alamo. A native, rapid grower with an elevation range of 5,000 - 9,500 feet. It attains a height of 50-70 feet with a crown spread of 30 feet. *Best uses* are windbreaks, riparian reforestation above 5,000 feet, erosion control and wildlife plantings (moderate for nesting and roosting cover; buds and twigs for food value). *Possible insect or disease problems*: cytospora canker, bacterial wetwood, leaf rusts. *Drought resistance*: fair. *Alkaline tolerance*: good. *Cold hardiness*: excellent.

Celtis occidentalis - Hackberry. A moderate grower, native to the NE section of New Mexico, it's elevation range is 4,000 - 7,000 feet. It attains a height of 40-60 feet with an equal crown spread, which gives it a globular form. *Best uses* are for wildlife plantings (high for song birds and small mammals) and windbreaks. *Possible insect or disease problems*: leaf gall psyllids, spiny elm caterpillar, nipple gall, hackberry witch's broom. *Drought resistance*: very good. *Alkaline tolerance*: very good. *Cold hardiness*: very good.

Robinia pseudoacacia - Black locust, algarrobo. A moderate grower. It's elevation range in New Mexico is 3,500 - 7,000 feet. It attains a height of 40 feet with a crown spread of 15-30 feet. *Best use* is for windbreaks. It has relatively low value as food (seeds) for birds. *Possible insect or disease problems*: locust borer. *Droughbt resistance*: good. *Alkaline tolerance*: good. *Cold hardiness*: fair.

Populus tremuloides - Aspen, alamillo, alamo temblon. A native with a rapid growth rate and moderate life span. It's elevation range is 5,500 - 10,500 feet in New Mexico. It attains a height of 35-50 feet and a crown spread of 20-30 feet. *Best uses* are for reforestation, wildlife plantings (high food value for grouse and browsers) and reclamation of sites above

6,500 feet (it spreads via root suckering). *Possible insect or disease problems*: poplar borer, oystershell scale, leaf miners, tent caterpillar, cytospora canker, leaf spot. *Drought resistance*: poor. *Alkaline tolerance*: poor. *Cold hardiness*: excellent.

Chrysothamnus nauseosus - Rubber rabbitbrush, chamisa, k'ii/tsoí nitsaaígíí. A native with a broad elevation range in New Mexico of 3,500 - 7,500 feet. It reaches a height of 4-6 feet with a spread of 4 feet. *Best uses* are for windbreaks, erosion control and reclamation of severly disturbed sites. It's showy fall flowers are an important source of food for bees. *Possible insect or disease problems*: leaf beetle, no other major pests. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: very good.

Ugnadia speciosa - Mexican-buckeye. A moderate to fast growing native to southern New Mexico, it's elevation range is 3,500 - 5,000 feet. A large shrub or small tree, it attains a height of 15 feet with a crown spread of 15 feet. It has showy, pink flowers. *Best uses* are for windbreaks and energy conservation plantings. The black seeds in the buckeye-like seed capsules are poisonous. *Possible insect or disease problems*: no major pests. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: fair - good (to 5 degrees F).

Fallugia paradoxa - Apache plume, ponil. A native, moderate grower with a broad elevation range of 3,500 - 8,000 feet in New Mexico. A showy shrub (white, simple rose flowers and purple seed plumes), it reaches a height of 4-6 feet with a crown spread of 3-5 feet. *Best uses* are for windbreaks, erosion control and wildlife plantings (fair hiding cover for birds). *Possible insect or disease problems*: no major pests. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: very good - excellent.

Ceratoides lanata - Winterfat, lambs tail, *Syn:* Eurotia lanata, Krascheninnidovia lanata. A native half-shrub with a fast growth rate and broad range. It's elevation range is 2,000 - 7,500 feet in New Mexico. It reaches a height of 2-4 feet with a crown spread of 3-4 feet. *Best uses* are for erosion control, range improvement, wildlife plantings and windbreaks. It is palatable to browsers, including domestic livestock and has fair value as cover for small mammals and birds. *Possible insect or disease problems*: no major pests. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: very good.

Robinia neomexicana - New Mexico locust, algarrobo, hojalito, uña de gato (No. NM). A native, large shrub or small tree, it has a moderate growth rate and is somewhat thicket forming. It's elevation range is 5,500 - 8,500 feet. It reaches a height of 15-25 feet with a crown spread of 10-15 feet. *Best uses* are for windbreaks, site reclamation, wildlife plantings and erosion control. *Possible insect or disease problems*: locust borer. *Drought resistance*: good. *Alkaline tolerance*: good. *Cold hardiness*: very good.

Quercus gambelii - Gambel oak, encino, tsé'ch'il. A native, large shrub or small tree, it has a slow - moderate growth rate. It's elevation range is 5,000 - 8,500 feet. It reaches a height of 10-40 feet with a crown spread of 10-20 feet. *Best uses* are for site reclamation, wood products (fuel wood & mushroom production), erosion control and wildlife (high food value for turkey and deer). *Possible insect or disease problems*: no major pests. *Drought resistance*: good. *Alkaline tolerance*: good. *Cold hardiness*: very good - excellent.

Chilopsis linearis - Desertwillow (not a true willow), mimbre. A native with a moderate - fast growth rate. It's elevation range is 1,000 - 5,000 feet. Found in dry washes and along roads, it reaches a height of 15-25 feet with a crown spread of 10-20 feet. *Best uses* are for windbreaks, erosion control (especially along dry washes), screens and wildlife plantings (fair - showy blossoms attract hummingbirds). *Possible insect or disease problems*: no major pests. *Drought resistance*: excellent. *Alkaline tolerance*: very good. *Cold hardiness*: fair to good.

REFERENCES:

Windbreak Technology. Proceedings of an International Symposium on Windbreak Technology, Lincoln, Nebraska, June 23-27, 1986. Edited by: J.R. Brandle, D.L. Hintz and J.W. Sturrock

Table 2

1998 NEW MEXICO FORESTRY DIVISION SEEDLING LIST

	MATURE HEIGHT	GROWTH RATE	LONGEVITY	WATER REQUIREMENTS	ALKALI TOLERANCE	ELEVATION RANGE
WOODS ROSE	**6'**	**Mod**	**Mod**	**Mod**	**Mod**	**5000-9000'**

Rosa woodsii Native to New Mexico and is popular due to showy pink flowers and attraction by birds. Hardy in slightly alkaline soils. Pinnately compound leaf. Good for erosion control, wildlife and windbreaks. BR

GREEN ASH **60' Fast Long Mod Mod 1000-7000'**
Fraxinus pennsylvanica A long-lived tree which does well in dry, sterile soils once established. It has moderate to rapid growth with supplemental water. Recommended uses are windbreaks and energy conservation plantings. BR

NATIVE PLUM **10' Fast Mod Mod Low-Mod 3000-7000'**
Prunus americana A thicket forming shrub adapted to a wide range of soils and requires supplemental watering on dry sites until established. It produces a small, edible plum which is a good wildlife attractant. Recommended uses are for windbreaks, wildlife plantings and erosion control. BR

SKUNKBUSH SUMAC **8' Mod Long Low Mod 3500-8000'**
Rhus trilobata This is an attractive, winter hardy native shrub. Clusters of small, yellow flowers bloom in late May and produce a small red fruit. This shrub is also called three-leaf sumac or squawbush. Recommended uses are windbreaks, wildlife plantings and erosion control. BR

NEW MEXICO FORESTIERA **8-10' Mod Mod-Long Low-Mod Mod 3000-7000'**
Forestiera neomexicana Also called NM olive or privet, this native shrub has a broad range in New Mexico. It forms a dense thicket or small tree. The small, yellow flowers on the female plants produce a small purple berry. Recommended planting uses are windbreaks, erosion control and wildlife plantings. BR

BLACK LOCUST **50-70' Fast Mod Low-Mod Mod 3500-7500'**
Robinia pseudoacacia An introduced tree which does well on poor soils with supplemental irrigation. The white or pink flowers are in clusters 4-5" long. The recommended planting use is windbreaks. BR

NANKING CHERRY **10' Mod Mod Low Low 3000-8500'**
Prunus tomentosa A spreading shrub with rose-type leaves. It is very cold hardy and flowers in late April. It produces an edible fruit and attracts wildlife. Recommended planting uses are windbreaks and wildlife plantings. BR

GOLDEN CURRENT **6' Mod Long Low-Mod Low-Mod 3000-9000'**
Ribes aureum A native, rounded shrub with bright green leaves and yellow blossoms in spring. It produces an edible fruit which can be eaten raw, dried or as preserves. Recommended planting uses are windbreaks, revegetation, erosion control and wildlife plantings. BR

CHOKECHERRY **6-25' Mod Mod Mod-High Low 4500-9000'**
Prunus virginiana A native shrub or small tree which forms dense barriers. Valuable for wildlife and streamside erosion control. It prefers deep and sandy loam soils. Recommended planting uses include windbreaks, riparian rehabilitation and wildlife plantings. BR

HACKBERRY **40' Mod Mod Low-Mod Mod 1000-7500'**
Celtis occidentalis A hardy, drought tolerant tree adapted to the hot, dry climate of New Mexico. This spreading tree produces fruit which are popular with birds. Recommended planting uses are windbreaks and wildlife plantings. BR

NOREASTER COTTONWOOD **70' Fast Mod High Low 1000-7000'**
Populus deltoides x nigra A fast growing tree, developing a narrow pyramidal crown which becomes broad and open. Male variety does not produce cotton. Recommended planting uses are windbreaks and erosion control. BR

LILAC **12' Fast Mod Mod Mod 4500-8000'**
Syringa vulgaris This violet flowered shrub grows across a wide variety of soils. Due to its growth habit, it is suitable in single or multi-row windbreaks and has high quality cover for wildlife. Recommended planting uses are windbreaks and wildlife plantings. BR

NARROWLEAF COTTONWOOD **70' Fast Long Mod-High Mod 5000-10,000'**
Populus angustifolia A native tree with willow-like leaves, common along streams in the mountains of New Mexico. It is the only winter hardy cottonwood in New Mexico. Recommended planting uses include windbreaks, wildlife plantings, erosion control and riparian area rehabilitation. BR, SM. CONT.

VELVET ASH **25-50' Mod Long Mod Mod 2000-7000'**
Fraxinus velutina Also called Arizona ash. A native tree widely distributed through canyon bottoms in SW New Mexico. It is well adapted to the desert areas of NM and has moderate wildlife value for birds. Recommended planting uses are riparian reclamation, windbreaks, erosion control and wildlife plantings. BR

AFGHANISTAN PINE **60' Fast Long Mod Mod 0-4500'**
Pinus eldarica A medium-sized tree native to southwest Asia. It forms a dense conical crown. An extensive root system gives this tree the ability to withstand drought. Plantings are best in southern New Mexico. Recommended planting uses are windbreaks, Christmas trees. SM. CONT.

Specification - 380-10

	MATURE HEIGHT	GROWTH RATE	LONGEVITY	WATER REQUIREMENTS	ALKALI TOLERANCE	ELEVATION RANGE
DESERTWILLOW	**25'**	**Fast**	**Mod**	**Mod**	**Mod**	**0-5000'**

Chilopsis linearis A native shrub or small tree found in washes and along roadsides. It has showy, white-lavendar flowers. Recommended planting uses are windbreaks, screens and dry wash reclamation. SM. CONT.

FOUR-WING SALTBUSH **4'** **Mod** **Long** **Low** **High** **0-7000'**
Atriplex canescens This native shrub grows across a wide variety of soils inc. saline soils. This is a highly prized browse plant by livestock and wildlife. Recommended planting uses are windbreaks, erosion control and reclamation of severly disturbed sites. SM. CONT., LG. CONT.-Supply Limited

RUBBER RABBITBRUSH (CHAMISA) **4-6'** **Mod** **Mod-Long** **Low** **Mod-High** **1000-7500'**
Chrysothamnus nauseosus A native shrub which grows well in disturbed sites and in alkaline soils. It produces a yellow flower in the fall. Recommended planting uses are windbreaks, erosion control and reclamation of severely disturbed sites. SM. CONT.

MEXICAN BUCKEYE **15'** **Fast** **Mod** **Low** **High** **1000-5000'**
Ungnadia speciosa A native shrub or small tree which grows across a wide variety of soils if well drained. It is drought tolerant once established. Clusters of small pink flowers appear in the spring. Recommended planting uses are windbreaks and energy plantings. SM. CONT.

ARIZONA CYPRESS **60'** **Fast** **Long** **Low** **Mod-High** **1000-5500'**
Cupressus arizonica A native tree with a conical crown. It survives well in shallow, alkaline soils. Its shape when young has suggested to some to be used for Christmas trees. Recommended planting uses are windbreaks, energy conservation plantings and Christmas trees. SM. CONT., LG. CONT. - Supply Limited

EASTERN REDCEDAR **40'** **Mod** **Long** **Low-Mod** **Mod** **3000-7000'**
Juniperus virginiana Native to the eastern and plains states, it forms a dense, narrowly pyramidal crown. It grows across a wide variety of soils, inc. those with a high water table. Recommended planting uses are windbreaks, living snow fences and energy conservation plantings. SM. CONT., LG. CONT.

APACHE PLUME **4-6'** **Mod** **Mod-Long** **Low** **Mod-High** **5000-8000'**
Fallugia paradoxa A native, it occurs along the sides of dry washes and hillsides. The roselike white flowers are showy in the early summer with feathery clusters of plume-like fruit in the fall and winter. Recommended planting uses are windbreaks, erosion control and wildlife plantings. SM. CONT.

WINTERFAT **3-4'** **Mod** **Long** **Low** **Mod-High** **2000-7500'**
Ceratoides lanata A hardy, native half-shrub with a range throughout New Mexico. It is heavily used as a browse plant. The seed heads in the fall give the plant a pleasing silvery appearance. Recommended planting uses are erosion control, range improvement, wildlife and windbreaks. SM. CONT., LG. CONT. - Supply Limited

PIÑON PINE **40'** **Slow** **Long** **Low** **Mod** **3500-9000'**
Pinus edulis The New Mexico State tree, it is an aromatice pine which grows across a wide variey of soils and does well under cultivation. It is popular for the edible nuts it produces. Recommended planting uses are windbreaks, reforestation and Christmas trees. SM. CONT., LG. CONT.

ROCKY MOUNTAIN JUNIPER **40'** **Mod** **Long** **Low** **Mod** **3500-9000'**
Juniperus scopulorum A hardy, native tree growing across a wide variety of soils. It is the fastest growing of Southwestern junipers and can be found along mountain streams and dry, rocky slopes. Recommended planting uses are windbreaks, reforestation and erosion control. SM. CONT.

SCOTS PINE (SCOTCH PINE) **50'** **Mod-Fast** **Long** **Mod** **Low-Mod** **3000-7500'**
Pinus sylvestris A native of Europe, the irregular pyramidal crown develops into a broad crown with age. It is widely planted for Christmas trees in parts of the U.S. Recommended planting uses are windbreaks, Christmas trees and energy conservation plantings. SM. CONT., LG. CONT.

AUSTRIAN PINE **60'** **Mod-Fast** **Long** **Mod** **Low-Mod** **3500-7500'**
Pinus nigra A native to Europe, but has proved to establish and grow well in the Southwest. Recommended planting uses are windbreaks and energy conservation plantings. SM. CONT., LG. CONT. - Supply Limited

GAMBEL OAK **20-70'** **Mod** **Long** **Mod** **Mod** **5000-8500'**
Quercus gambelii A native tree or large shrub recognized by the deeply lobed leaves which are larger than those of other Southwestern oaks. This is the only common tree oak in northern New Mexico. Recommended planting uses are reclamation, wood products, erosion control and wildlife. SM. CONT., LG. CONT. - Supply Limited

NEW MEXICO LOCUST **15-25'** **Fast** **Long** **Mod** **Mod** **4500-8500'**
Robinia neomexicana A native tree with showy clusters of purplish flowers in the spring. This plant is especially useful for erosion control due to its rapid growth and thicket forming tendencies. Recommended planting uses are windbreaks, reclamation, wildlife and erosion control. SM. CONT.

PONDEROSA PINE **80'** **Mod** **Long** **Mod** **Low-Mod** **4500-9000'**
Pinus ponderosa A large, native tree, it is the primary commercial tree species in New Mexico. Its pyramidal shape when young becomes conical with age. It does best on well drained soils. Recommended planting uses are reforestation and windbreaks. SM. CONT., LG. CONT.

DOUGLAS-FIR **80'+** **Mod** **Long** **High** **Low** **4500-10,000'**
Pseudotsuga menziesii A large, native tree with a dense, conical crown. It has moderate resistance to drought above 6500'. Recommended planting uses are reforestation and Christmas trees. SM. CONT., LG. CONT. - Supply Limited

NRCS, NM
November, 2006

	MATURE HEIGHT	GROWTH RATE	LONGEVITY	WATER REQUIREMENTS	ALKALI TOLERANCE	ELEVATION RANGE
SOUTHWESTERN WHITE PINE	**80'**	**Mod**	**Long**	**Mod**	**Low**	**4500-10,000'**
BLUE SPRUCE	**80'**	**Slow**	**Long**	**High**	**Low**	**5000-10,000'**
WHITE FIR	**80'**	**Slow**	**Low**	**Mod-High**	**Low**	**5000-10,000'**
ASPEN	**60-80'**	**Fast**	**Mod**	**Mod-High**	**Low**	**6500-10,000'**

Pinus strobiformis A large native tree which grows well in a forest environment. It's blue-green foliage makes it a formal-looking tree when young. It has edible seeds, similar though smaller than those of piñon. Recommended planting uses are reforestation, Christmas trees and windbreaks. SM. CONT.

Picea pungens A native with a conical shape. The color of the foliage is green to blue. It requires supplemental water and may require shade protection when young. Recommended planting uses are reforestation, Christmas trees and windbreaks. SM. CONT., LG. CONT.

Abies concolor A native tree, it is widely used as a Christmas tree in New Mexico. It has a conical shape which becomes irregular with age. Recommended planting uses are reforestation and Christmas trees. SM. CONT., LG. CONT.

Populus tremuloides A native tree widely distributed above 7500' as a pioneer species after disturbance. Domestic livestock, elk and deer browse the foliage when within reach. Recommended planting uses are reforestation, wildlife plantings and reclamation of disturbed sites above 6500'. SM. CONT.

BR = Bareroot; SM. CONT. = Small Containerized; LG. CONT. = Large Containerized
Small Containers are 7 & 10 cubic inch volume. Large Containers are 40 cubic inch volume.